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# METHYLENE CHLORIDE INFORMATION EXCHANGE PROGRAMME: SURVEY RESULTS

**ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT**

**Paris 1996**

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# METHYLENE CHLORIDE INFORMATION EXCHANGE PROGRAMME: SURVEY RESULTS

Environment Directorate

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1996

**The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) was established in 1995 by UNEP, ILO, FAO, WHO, UNIDO and the OECD (the Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.**

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***There is a list of OECD Environmental Health and Safety publications beginning on page 25.***

# Background

In November 1994, the 22nd Joint Meeting of OECD's Chemicals Group and Management Committee agreed to the formation of an Information Exchange Programme on methylene chloride to supplement the information contained in the OECD Risk Reduction Monograph on methylene chloride.[1] Subsequent to the meeting, a Steering Group was formed to initiate the programme and provide general oversight. **Austria, Japan, the Netherlands, Switzerland, the Commission of the European Communities** and **the OECD's Business and Industry Advisory Committee (BIAC)** agreed to participate in this Steering Group. It was agreed that the Programme should focus on information from Member countries and industry on existing and new approaches for controlling methylene chloride exposure, and the health and environmental effects of possible substitutes.

In July 1995, a questionnaire developed by the Steering Group was distributed to Member countries and BIAC. It requested new information concerning the risk posed by methylene chloride, production and use of methylene chloride and other paint stripping formulations, and risk reduction measures applied to these substances. Information was submitted by Austria, Belgium, Canada, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, the United States, and BIAC; Australia, Norway and the International Registry of Potentially Toxic Chemicals (IRPTC) responded that they did not have additional information to provide.

This report summarises the responses provided by Member countries and industry.

A copy of the questionnaire is presented in **Annex I**.

This document was produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC). Derestriction was recommended by the OECD's Joint Meeting of the Chemicals Group and Management Committee of the Special Programme on the Control of Chemicals. It is published on the responsibility of the Secretary-General of the OECD.

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[1] *Risk Reduction Monograph No. 2: Methylene Chloride. Background and National Experience with Reducing Risk* [OCDE/GD(94)95]. Paris, 1994.

# – Risk Information

| – 1. Have you conducted an evaluation of the hazard and/or risk to man and the environment from chemicals that may be used for paint stripping formulations? If so, could you please provide a copy of this evaluation? | |
|---|---|
| **Austria** | Current investigations into the hazard and/or the health effects of chemicals that may be used for paint stripping formulations are only available for N-methyl-2-pyrrolidone (CAS 872-50-4). There is an established maximum permissible workplace concentration (MA list NR 2/1993 of the Ministry of Labour and Social Affairs) of 100 ppm or 400 mg/m$^3$. (Use of this substance results in acute skin irritation and has led to problems. Due to its low volatility it is increasingly used as a substitute for chlorinated hydrocarbons.) Another report on the effects of N-methyl-2-pyrrolidone comes from the electronics industry [Beaulieu, H.J. and Schrember, K.R., *Applied Occupational and Environmental Hygiene* 6 (1991), 874-880; cited in *Arbeit und Ökologie-Briefe* NR 1 (1993)]. |
| **Belgium** | No new study regarding the assessment of the hazard and/or risk to man and the environment from methylene chloride is available in Belgium. |
| **Canada** | An environmental and human health risk assessment for methylene chloride (dichloromethane) has been prepared under the Canadian Environmental Protection Act. |
| **Finland** | Following publication of the OECD Risk Reduction Monograph on methylene chloride, the use and environmental impact of methylene chloride have been assessed. |
| **Germany** | The hazard from methylene chloride and some other chemicals used for paint stripping has been addressed in the Technical Rules for Hazardous Substances (TRGS 612, Undesgesetzblatt 1993). |
| **Ireland** | No. |
| **Italy** | No. |
| **Japan** | No. |
| **The Netherlands** | No. |
| **Sweden** | The Nordic Chemical Group under the Nordic Council of Ministers has evaluated the health effects of certain chemicals that are used within the Nordic countries. Two of these chemicals can be used as paint strippers: y-butyrlactone (Cas No 96-48-0) and methyl pyrrolidone (Cas No 872-50-4). |
| **Switzerland** | No. |

| | |
|---|---|
| **United Kingdom** | The Technology and Health Sciences Division of the UK's Health and Safety Executive (HSE) is currently carrying out a review of the maximum exposure limit (MEL) for methylene chloride for the Working Group on the Assessment of Toxic Chemicals (WATCH). This review includes an assessment of critical toxicity studies, reference to the IPCS EHC published in 1996 and data on production, uses, exposure, control and sampling of methylene chloride. The review is scheduled to go to the September 1996 WATCH meeting.<br><br>In late 1994, HSE published a Specialist Inspector Report (SIR), *Dichloromethane (methylene chloride) exposure and control during paint stripping*. The report details occupational exposure during paint stripping and the methods used to control exposure, including the use of alternatives and their relative merits. |
| **United States** | The USEPA Office of Prevention, Pesticides, and Toxic Substances Paint Stripping Cluster developed a lifecycle analysis for the use of N-methyl pyrrolidone (NMP) in paint stripping. It was made available in September 1993. The analysis concluded that a reproductive and developmental risk exists from use of NMP, and that it can be readily and significantly reduced by use of impermeable gloves.<br><br>Under a consent agreement with USEPA, the manufacturers of NMP are conducting a number of toxicity tests. |
| **BIAC** | BIAC Member Companies <u>have not</u> conducted research on paint stripping chemicals other than methylene chloride.<br><br>BIAC Member Companies are aware that both N-methyl pyrrolidone and dibasic esters are subject to the mandatory USEPA Federal Test Programme and that some results are available from these programmes. |

| – 2. Have you any new data on the health and environmental effects of methylene chloride that are not cited in the Risk Reduction Monograph? If so, could you please provide these data? | |
|---|---|
| **Austria** | With the exception of recent experiments on the effects of methylene chloride on the heart there are no new data available (information from the Bundesanstalt für Arbeitsmedizin, March 1994, 4-5). |
| **Belgium** | NR |
| **Canada** | No. |
| **Finland** | On the basis of Finland's investigations, methylene chloride may pose a risk for the aquatic environment. The results of a vast survey carried out in the eighties by the Finnish environmental authorities show that concentrations of methylene chloride in leachates from so-called "high-risk" landfills were high. |
| **France** | In view of the recent test results on the specific mechanism of carcinogenicity observed in the mouse (several publications summarized by T. Green) and epidemiological surveys on workers regarding methylene chloride's toxic effects [e.g. Hearne and Pifer (1996) *Toxicologist* 30:94; Tomenson et al. (1996) *Toxicologist* 30:94] France would like the carcinogenic properties of methylene chloride to be re-examined. |
| **Germany** | An extensive study has been performed on methylene chloride induced mouse liver and lung tumours. In addition, a prolonged Daphnia test according to OECD Test Guideline 202, Part II has become available since the Risk Reduction Monograph was completed. |
| **Ireland** | No. |
| **Italy** | No. |
| **Japan** | A seminar was held in Paris by ECSA (European Chlorinated Solvent Association) on "Methylene chloride, new science: future use" in October 1995. The three following presentations were given:<br>"Methylene chloride: Health effects and overview of industry funded studies" (Elf Atochem)<br>"Overview of research into the mechanism of action of methylene chloride and its relevance to humans" (Zeneca)<br>"Methylene chloride epidemiology" (ICI) |
| **The Netherlands** | No. |
| **Sweden** | No. |
| **Switzerland** | Report No. CTL/R/2246: *Methylene chloride induced mouse liver and lung tumours: An overview of research into the mechanism of action and its relevance to humans* (T. Green) (Zeneca Central Toxicology Laboratory, U.K. ) (31/07/1995). |
| **United Kingdom** | No. |
| **United States** | The US Occupational Health and Safety Administration (OSHA) is examining the latest relevant publications in its reopened rulemaking for an occupational exposure standard test for methylene chloride, and is drafting a final regulation on exposure to methylene chloride in the workplace. |

| | |
|---|---|
| **BIAC** | BIAC Member Companies producing methylene chloride are part of a global consortium of methylene chloride producers which has funded a 3-year research programme on the mechanism of methylene chloride induced carcinogenicity in mice and its significance for humans. This programme, conducted at the Toxicology Laboratory of Zeneca-CTL in the UK (principal investigator: Dr. Trevor Green) has now been completed. The results of the study show that response to methylene chloride in the mouse is unique to that species and that the mouse cannot be considered an appropriate model for human health hazard assessment. |

<table>
<tr><td colspan="2">– 3. Has your assessment of the risk posed by methylene chloride changed since the Risk Reduction Monograph was published?</td></tr>
<tr><td>Austria</td><td>No.</td></tr>
<tr><td>Belgium</td><td>NR</td></tr>
<tr><td>Canada</td><td>No.</td></tr>
<tr><td>Germany</td><td>No.</td></tr>
<tr><td>Ireland</td><td>No information was provided for the Risk Reduction Monograph. This Authority believes more recent data from industry indicate that the risk posed by methylene chloride is somewhat less than was perceived several years ago.</td></tr>
<tr><td>Italy</td><td>No.</td></tr>
<tr><td>Japan</td><td>Achievement Rates for Environmental Quality Standard (0.02mg/l or less) of methylene chloride in Japan:
<table>
<tr><th></th><th>Detections (B) / Samples (λ) (Exceeding) (Ratio B/λ)</th><th>Detection Range</th><th>Year</th></tr>
<tr><td>Public water area</td><td>6 / 4594 (2) (0.13%)</td><td>Max.: 0.15mg/l</td><td>FY 1993</td></tr>
<tr><td>Ground water</td><td>15 / 1334 (0) (1.1%)</td><td>0.002~0.019mg/l</td><td>FY 1993</td></tr>
</table></td></tr>
<tr><td>The Netherlands</td><td>No.</td></tr>
<tr><td>Sweden</td><td>No.</td></tr>
<tr><td>Switzerland</td><td>No.</td></tr>
<tr><td>United Kingdom</td><td>The results of HSE's current review of the MEL should be known by mid- to late 1996.</td></tr>
<tr><td>United States</td><td>No.</td></tr>
<tr><td>BIAC</td><td>The results of the new research programme on methylene chloride indicate that the mouse cannot be considered an appropriate model for human health hazard assessment. This information will be forwarded to the EU Commission for use in the EU Risk Assessment Process on Existing Substances (Regulation No. 793/93). Most probably, methylene chloride will appear on the 3rd EU priority list for Risk Assessment, with France being the Rapporteur.</td></tr>
</table>

# – Production and Use

– 4. What is the current level and trend over the last three years for the production, import and export of methylene chloride in your country?

**Austria**

| Year | Import (Tons) | Export (Tons) |
|---|---|---|
| 1990 | 2750 | 314 |
| 1991 | 2417 | 385 |
| 1992 | 1833 | 176 |
| 1993 | 1000 | 122 |
| 1994 | 914 | 70 |

**Belgium**

NR

**Canada**

**Methylene chloride is no longer produced in Canada**. The current levels and trends of import and export figures in terms of dollars are as follows:

Import:

| | | |
|---|---|---|
| 1992 | $ 3 828 000 | approx. 5 240 t/y (*$0.73/kg) |
| 1993 | $ 4 512 000 | approx. 6 181 t/y (based on 1992 price per kg) |
| 1994 | $ 5 044 000 | approx. 6 909 t/y (based on 1992 price per kg) |

Export:

| | | |
|---|---|---|
| 1992 | $ 288 000 | approx. 395 t/y (*$0.73/kg) |
| 1993 | $ 310 000 | approx. 424 t/y (based on 1992 price per kg) |
| 1994 | $ 359 000 | approx. 491 t/y (based on 1992 price per kg) |

*1992: price per kg from CIS (Corpus Information Services) 1990. CPI product profile: methylene chloride. March 1990.
1993 and 1994: Statistics Canada, Export and Merchandise Trade, Catalog No. 65202;
and Statistics Canada, Imports Merchandise Trade, Catalog No. 65203.

**Finland**

**Methylene chloride is not produced in Finland**.
The volume imported in the nineties has been around 1000 tones per year.

**Germany**

The levels and trends over the last few years (1991 to 1994), as far as they are available to German industry, are presented below:

| | **1991** | **1992** | **1993** | **1994** |
|---|---|---|---|---|
| production in Germany [kt/a] | 98.3 | 75.5 | 70.8 | 52.0 |
| amount available on the German market [kt/a] | 28 | 24 | 19.5 | 18 |
| German production + Import from EU-countries [kt/a] | 27.9 | 22.7 | 17.2 | 16.3 |
| Import from non-EU-countries [kt/a] | 0.1 | 1.3 | 2.3 | 1.8 |
| amount used for open applications [kt/a] | 5.05 | 2.48 | 3.24 | no data* |
| amount sold for paint stripping [kt/a] | 2.438 | 1.443 | 2.728 | no data* |

*Evaluation of the data has not been completed yet by VCI.

<table>
<tr><td></td><td>German production volume has decreased by about 47% since 1991 and the German market has shrunk by 36% within the same period of time. From 1991 to 1993 the amount of methylene chloride sold in Germany for open application decreased by 36%, whereas for paint stripping no decrease is recorded. In addition, yet unidentified quantities of methylene chloride are available on the German market that are sold by distributors who are not members of the German Chemical Industry Association (VCI).</td></tr>
<tr><td>Ireland</td><td>The trend over the last 3 years has been for the import of methylene chloride to decrease. Ireland is not a producer or exporter of methylene chloride</td></tr>
<tr><td>Italy</td><td>In Italy the global use of methylene chloride is approximately 32,500 t/y (1994 data). In the last few years, the estimated consumption has registered a slight percent decrease per year. The use of methylene chloride in paint stripping formulations, at both the industrial and retail level, is on the order of 3000 t/y; during the last few years, the trend was stable with a slight decreasing tendency.</td></tr>
<tr><td>Japan</td><td>The statistical data on the production, import and export of methylene chloride in Japan for the past three years are as follows (unit: tones/year):<br><br>
<table>
<tr><td>Year</td><td>Production</td><td>Import</td><td>Export</td></tr>
<tr><td>1992</td><td>83.518</td><td>5.984</td><td>2.229</td></tr>
<tr><td>1993</td><td>93.349</td><td>14.963</td><td>2.968</td></tr>
<tr><td>1994</td><td>88.877</td><td>11.435</td><td>3.435</td></tr>
</table>
</td></tr>
<tr><td>The Netherlands</td><td>The only data available are from ten years ago. The total production capacity in the Netherlands was 15 kton in 1985. From personal communication with AKZO Chemicals it appears that the total production in the Netherlands has decreased a little since 1985. The explanation from AKZO is that the paint stripping formulations are being used more efficiently. Most methylene chloride use in the Netherlands is by private individuals.</td></tr>
<tr><td>Sweden</td><td>Methylene chloride is not produced in Sweden.<br>There was a slight decrease in the amount of methylene chloride imported during the period 1992-1994. In 1992 the amount was approximately 1400 tons, compared to the estimated amount of 1100 tons in 1994 and 1070 tons in 1995.</td></tr>
<tr><td>Switzerland</td><td>The import of methylene chloride into Switzerland has diminished in the last few years.<br><br>
<table>
<tr><td>1988</td><td>5717 tons</td></tr>
<tr><td>1990</td><td>5023 tons</td></tr>
<tr><td>1993</td><td>3138 tons</td></tr>
<tr><td>1994</td><td>3129 tons</td></tr>
</table>
<br>Approximately 30% of the quantity imported in 1994 was used in paint stripper applications.</td></tr>
<tr><td>United Kingdom</td><td>The estimated total amount of methylene chloride in the UK is 30,000 tones. Further details are not currently available.</td></tr>
</table>

**United States**

| Year | Production, millions of lbs | Import, millions of lbs | Export, millions of lbs | US Supply, millions of lbs |
|---|---|---|---|---|
| 1993 | 354 | 16 | 133 | 237 |
| 1994 | 410 | 9 | 180 | 239 |
| 1995 | 388 | 19 | 162 | 245 |

Methylene chloride demand in the US has remained relatively stable over the last three years. Imports fluctuated by 50% over the same time period, but remained within the historical range of 10-20 million pounds per year. Export of methylene chloride has increased significantly since 1993, and currently is at the high end of its historical range.

US use patterns for methylene chloride (% of total):

| | 1993 | 1994 | 1995 |
|---|---|---|---|
| Paint Stripping | 30 | 29 | 28 |
| Aerosols | 14 | 13 | 11 |
| Foam Blowing | 13 | 12 | 10 |
| Adhesives | 10 | 9 | 12 |
| Chemical Processing Intermediates | 9 | 9 | 9 |
| Pharmaceutical | 9 | 10 | 10 |
| Surface Cleaning | 7 | 9 | 10 |
| Coatings | 3 | 3 | 4 |
| Other | 5 | 6 | 5 |
| Total | 100 % | 100 % | 100 % |

**BIAC**

**Methylene chloride is not produced in Switzerland**.

The member companies of the European Chlorinated Solvent Association (ESCA) have imported the following amount of methylene chloride into Switzerland during the last 3 years:

| | |
|---|---|
| 1992 | 3701 metric tons |
| 1993 | 3086 metric tons |
| 1994 | 3049 metric tons |

| – 5. What is the current level and trend over the last three years for the production, import and export of other paint stripping formulations? | |
|---|---|
| **Austria** | For chlorinated hydrocarbon free removers, alkaline substitutes are the most prevalent in use today. These formulations may contain N-methyl-2-pyrrolidone, potassium hydroxide, ethanolamine and methanol. Removers based on high boiling alcohols and amines are also in use |
| **Belgium** | NR |
| **Canada** | Data on the production, import and export of other paint stripping formulations are not available. |
| **Finland** | No information available. |
| **Germany** | Non-methylene chloride based solvent strippers have been available on the German market since 1989, but according to an estimation of one major producer they still account for less than 12% of the market. No figures are available on import and export volumes of those alternative paint strippers, nor on the costs of production and use. From Annex 5, some information can be obtained to evaluate the advantages and disadvantages of the use of various paint strippers. (In the TRGS 612 alternative solvent strippers are listed and assessed.) |
| **Ireland** | No information available. |
| **Italy** | On the Italian market, the most common chemical alternatives to methylene chloride used as a paint stripping agent are: kettle mixtures (niethyl-ethylketone being the main component), dibasic esters, N-methyl pyrrolidone, dimethylsulfoxide, and aqueous solutions of powders which release alkali. These alternatives do not have a significant relevance at the national industrial level yet; the market share of alternative chemicals has been slightly but constantly increasing in the last few years, especially for retail selling, but it still accounts for less than 10% of the market. |
| **Japan** | No information available. |
| **The Netherlands** | No recent data are available on the level and trend over the last three years of production, import and export of other paint stripping formulations. An estimation from AKZO is that about 15% of the total production of these formulations is due to methylene chloride production. |
| **Sweden** | Methyl pyrrolidone is the most common chemical alternative to methylene chloride as a paint stripping agent in Sweden. In 1992 the imported amount was approximately 360 tons. In 1994 the estimated amount doubled to 700 tons, and in 1995 the estimated amount has increased to approximately 1000 tons. |
| **Switzerland** | No information available. |
| **United Kingdom** | No information available. |
| **United States** | No information available. |
| **BIAC** | No information available. |

<table>
<tr><td colspan="2">– 6. Do you have any information which compares the cost of production and use of methylene chloride with that of other chemicals (or alternative systems) which have comparable technical efficacy?</td></tr>
<tr><td>Austria</td><td>No.</td></tr>
<tr><td>Belgium</td><td>NR</td></tr>
<tr><td>Canada</td><td>No.</td></tr>
<tr><td>Finland</td><td>No.</td></tr>
<tr><td>Germany</td><td>No.</td></tr>
<tr><td>Ireland</td><td>No.</td></tr>
<tr><td>Italy</td><td>The widespread use of alternative chemicals to methylene chloride in Italy is unlikely due to the elevated costs (1.5-8 times higher than using methylene chloride), unfavourable cost vs. technical efficacy rate, and slow speed to achieve the desired effects.</td></tr>
<tr><td>Japan</td><td>No.</td></tr>
<tr><td>The Netherlands</td><td>The Dutch Consumers Organisation (Consumentenbond) has done a comparison between several paint stripping formulations. One of the aspects studied were the costs summarised below. The prudent conclusion is that there is no relation to methylene chloride percentage in product and price or result.
<table>
<tr><th>Brand</th><th>% of methylene chloride in product</th><th>costs per $m^2$ (in gilders)</th><th>working time (in minutes)</th><th>total result</th></tr>
<tr><td>Alabastine</td><td>most important ingredient</td><td>8.30</td><td>50 - 105</td><td>good</td></tr>
<tr><td>Afbijt groen</td><td>0%</td><td>9.20</td><td>40 - 60</td><td>good</td></tr>
<tr><td>Green strip</td><td>0%</td><td>9.70</td><td>45 - 60</td><td>good</td></tr>
<tr><td>HEMA</td><td>0% (?)</td><td>4.30</td><td>30 - 45</td><td>reasonable</td></tr>
<tr><td>De Parcl</td><td>80 - 85 %</td><td>6.60</td><td>45 - 75</td><td>reasonable</td></tr>
<tr><td>Wickes</td><td>> 80 %</td><td>7.30</td><td>75 - 135</td><td>reasonable</td></tr>
<tr><td>Flexa</td><td>0%</td><td>8.20</td><td>30 - 45</td><td>reasonable</td></tr>
<tr><td>BID-fluxaf</td><td>0%</td><td>6.60</td><td>60 - 105</td><td>reasonable</td></tr>
<tr><td>AURO</td><td>0%</td><td>24.30</td><td>45 - 240</td><td>moderate</td></tr>
</table></td></tr>
<tr><td>Sweden</td><td>No.</td></tr>
<tr><td>Switzerland</td><td>No.</td></tr>
</table>

| | |
|---|---|
| **United Kingdom** | The UK authorities have no information comparing the cost of production and use of methylene chloride with that of other chemicals (or systems) with similar efficacy. The UK however would not compare chemicals (or systems) solely on the basis of cost. Comparisons would be made in general terms, on the basis of risk, for systems with similar cost and efficacy. |
| **United States** | The USEPA, through its Office of Research and Development (ORD), has made available the Solvents Alternative Guide (SAGE). This tool is available in electronic form only. It is available on the Internet (address: http://clean.rti.org/tools.htm) and on the Control Technologies Center Bulletin Board. |
| **BIAC** | BIAC has no information available which compares the cost of production and use of methylene chloride with that of other chemicals or alternative systems. |

| – 7. Do you have any information which evaluates the use of various paint removal systems under consumer and industrial conditions? | |
|---|---|
| **Austria** | There is no information available for this question. |
| **Belgium** | NR |
| **Canada** | A report evaluating the efficacy of various paint strippers has been published through the USEPA - Each of 11 strippers was evaluated for its relative toxicity and potential environmental hazard. Strippers containing methylene chloride were found to be the most efficient, with dilution with water being a significant means of reducing hazardous environmental impacts (Hahn, W.J. and Werschulz, P.P. 1991. Evaluation of Alternatives to Toxic Organic Paint Strippers, EPA/600/2-86/063, PB86-219177). |
| **Finland** | No. |
| **Germany** | No. |
| **Ireland** | No. |
| **Italy** | No. |
| **Japan** | No. |
| **The Netherlands** | Our Ministry has instructed the Netherlands Organization for Applied Scientific Research (TNO) to do a survey on the removal aspects of acrylate paints. In this report, which was published in September 1993, several paint stripping formulations were tested. The main conclusion was that it isn't necessary to use methylene chloride: other paint removal chemicals are just as good. |
| **Sweden** | No. |
| **Switzerland** | No. |
| **United Kingdom** | The UK's Specialist Inspector Report (SIR) discusses the merits of various paint removal systems. |
| **United States** | The USEPA Paint Stripping Cluster conducted an analysis of over 83 substances used in stripping paint. This report will be available soon. |
| **BIAC** | Hereafter are the summarised comments made by a leading supplier of paint stripper formulations of all types to consumer and industrial markets:<br><br>"The consumers want a paint stripper that is safe to use and environmentally friendly, but it must work effectively. Products based on methylene chloride are superior to any currently available alternative for use on alkyd gloss paints and varnishes...which still make up the vast majority of the paint types that consumers wish to remove" (cited from Nitromors, a subsidiary of Henkel) |

# – Risk Reduction Measures

| – 8. *Governments only* : Have you implemented, or do you plan to implement, any risk reduction measures (e.g., regulations) to reduce workspace emissions or releases from point sources of methylene chloride to air or water? [Only respond if this information is not currently in the Risk Reduction Monograph] | |
|---|---|
| **Austria** | The ordinance of the Federal Minister of Economic Affairs, in accordance with the Federal Minister of Labour and Social Affairs and the Federal Minister for the Environment, Federal Law Gazette No 865/1994 aims at the reduction of emissions of methylene chloride in the workplace with respect to ambient air. This ordinance regulates the application of chlorinated hydrocarbon generally in new and existing plants (according to the Tride Code, FLG No 194/1994). Among other things the ordinance contains provisions, for example, for purification plants for waste air, safety measures, storage conditions for chlorinated hydrocarbon, etc.<br>The term "chlorinated hydrocarbon" in the ordinance is defined in such a way that methylene chloride falls within the range of the regulations. |
| **Belgium** | The applicable regulatory measures in Belgium to reduce workplace emissions are in alignment in general with the European Union policy in the global approach to risks linked to hazardous chemicals. The Belgian Department in charge of Employment and Labour follows this global approach. The risk reduction approach is linked to a judicious risk evaluation which is the employer's responsibility; employers have to adopt the necessary preventive measures. Regarding the risk reduction measures to reduce releases from point sources of methylene chloride to air or water, below are data provided by the Flemish regional authorities. Releases of methylene chloride are forbidden if the substance is not clearly mentioned in an authorisation. Regarding releases to air, a limit value of 150mg/$Nm^3$ has been fixed (cf. VLAREM II, art. 81 et VLAREM II bis, annex 4.4.2) from a flow of 3000 g/h. Until now, the substance had to be mentioned by firms in their annual emission reports; 5 tons/year was the limit value for air and water separately (VLAREM II). In the new VLAREM, value limits have been reduced to 100kg/day (air) and 10kg/day (water). On the basis of the Inventory of Emissions in the Flemish area and the annual emission reports, 942 tons of methylene chloride were released in Flanders in 1993: 61% from the chemical industry, 5% from the metallurgical industry, 5% from the food industry and 29% from the rubber and plastics industry. |
| **Canada** | Currently, a draft control options data collection survey is being circulated in part of the first stage in the control options process. Once the information on methylene chloride is received it will be examined and used to make a decision regarding control options with the possibility of regulations |
| **Finland** | NR |
| **Germany** | The recommendations for methylene chloride stated in the TRGS (p. I 37) are supported by the German Federal Environmental Agency. No information about the implementation of further emission or risk reducing measures has become available since the Monograph was published. |
| **Ireland** | A national occupational exposure limit (8-hour TWA) of 100 ppm was introduced in 1995; however this cannot be regarded as a risk reduction measure as the UK and the ACGIH were used as standards prior to this. |

| | |
|---|---|
| **Italy** | A guideline was drafted in 1991 which provides a Maximum Allowable Concentration (MAC) for methylene chloride in drinking water of 20 pg/L. This guideline has not been incorporated into a regulation. |
| **Japan** | The effluent standard (0.2mg/l or less) for methylene chloride prescribed under the "Water Pollution Control Law" was introduced on 1st February 1994. Under the "Water Pollution Control Law", prefectural governors have responsibilities for surveying and controlling the effluents from factories and industrial establishments. |
| **The Netherlands** | The Netherlands ministry is concerned about the health of the users of methylene chloride based paint strippers, especially when the instructions for use are not followed. The painters' lobby has indicated that the use of methylene chloride may be forbidden. Based on this, the Netherlands is considering future steps. |
| **Sweden** | All occupational use of methylene chloride (and trichloroethylene) has been prohibited since 1st January 1996. The prohibition is entered in the Ordinance of Chlorinated Solvents, Swedish Code of Statutes (SFS 1991:1289). The National Chemicals Inspectorate has decided upon regulations on exemptions from this prohibition. The prohibition does not apply to marketing or use of methylene chloride (and trichloroethylene) for research and development or analysis purposes (KIFS 1995:6). |
| **Switzerland** | No. |
| **United Kingdom** | No. |
| **United States** | In December 1994, the USEPA promulgated in the US Federal Register a national emission standard (NESHAP) for solvent degreasing with halogenated solvents, including methylene chloride. In September 1995, the USEPA published a NESHAP for aerospace manufacturing and work facilities, including depainting. This regulation sets maximum levels for environmental emissions from this work. In 1995, USEPA promulgated an emission standard (under court challenge) for wood furniture manufacture which restricts the use of methylene chloride as a coating and wash-off solvent.<br>The US Occupational Health and Safety Administration is currently developing workplace exposure standards. The US Consumer Product Safety Commission is working to optimise labelling as a mechanism for consumer and workplace protection.<br>Remark: Although work related to methylene chloride goes forward, methylene chloride itself is not the central focus. |
| **BIAC** | |

| – 9. *Industry only*: Have you installed new equipment, or made process changes, to control releases of methylene chloride? [Only respond if this information is not currently in the Risk Reduction Monograph.] | |
|---|---|
| **Austria** | |
| **Belgium** | |
| **Canada** | |
| **Finland** | |
| **Germany** | |
| **Ireland** | On behalf of Irish industry, the Health and Safety Authority is aware that the Irish chemical manufacturing industry is systematically implementing process changes in order to control releases of methylene chloride. Emission limits are being imposed by the new Environmental Protection Agency. |
| **Italy** | |
| **Japan** | |
| **The Netherlands** | |
| **Sweden** | |
| **Switzerland** | Equipment for the control of emissions is continuously being improved. The present processes are being evaluated regarding a possible substitution of methylene chloride; but there is still no known substitute for methylene chloride in several procedures for the manufacture of pharmaceuticals. As methylene chloride is recycled in practically closed systems and incinerators are used if there are further emissions, no significant emissions reach the environment. Therefore no further measures are necessary for this application at present. |
| **United Kingdom** | |
| **United States** | Response made by the Halogenated Solvent Industry Association of the US:<br>• implementation of a $CO_2$ process for polyurethane foam blowing, which has the potential to reduce methylene chloride emissions significantly;<br>• promulgation of the previously mentioned degreasing NESHAP, which becomes effective in December 1997, has stimulated the installation of control equipment for degreasers using methylene chloride. |
| **DOW Chemical Company (on behalf of BIAC)** | DOW Chemical Company has not installed new equipment or made progress changes to control releases of methylene chloride from its chloromethanes plant in Stade, Germany, since the publication of the OECD Monograph on methylene chloride.<br>The use of methylene chloride in the pharmaceutical industry is today the most important sector both in volume and value creation. The product is used for extraction purposes and in tablet coating applications. The solvent is recycled and occasionally distilled in a closed process. Residues are incinerated in a special waste incinerator.<br>The semi-professional and private paint stripping market is an area which we recognise and agree to be of concern. We will continue to encourage continuous reductions in emissions by closed-loop processes and to promote good safety working practices. |

| – 10. Have you evaluated the effectiveness of any of the risk reduction measures identified in the Risk Reduction Monograph or those provided in response to questions 8 and 9 above? | |
|---|---|
| **Austria** | The commercial use of methylene chloride as a remover has been decreasing rapidly in the last three years. Today, as information from the industry shows, methylene chloride based commercial removers are rarely used. It is still used as a solvent in paints, but because of new product development it is frequently substituted. The use of methylene chloride continues to play a part in the pharmaceutical industry, but such use is also declining. |
| **Belgium** | NR |
| **Canada** | Some risk reduction measures taken towards paint stripping operations can be found in the Proceedings to the International Conference on Reducing Risk in Paint Stripping, held in Washington, DC, February 12-13, 1991 (Flock, G. 1991. Reducing Risk in Paint Stripping: Proceedings of an International Conference. Washington, DC, February 12-13. EPA-68-DO-0020, PB91-224303). |
| **Finland** | NR |
| **Germany** | NR |
| **Ireland** | No |
| **Italy** | No information available. |
| **Japan** | The situation in regard to compliance with the effluent standard which was introduced on 1st February 1994 under the "Water Pollution Control Law" is under investigation. |
| **The Netherlands** | No. |
| **Sweden** | Half a year before the prohibition of the sale of methylene chloride for consumer use came into force, the National Chemicals Inspectorate conducted a short survey among the suppliers of such products. Most of them had already found substitutes for methylene chloride. They also reported that there were no problems associated with the substitution. |
| **Switzerland** | No. |
| **United Kingdom** | The Specialist Inspector Report (SIR) discusses the effectiveness of the control measures detailed in the Monograph. |
| **United States** | National Institute for Occupational Safety and Health work on paint stripping included evaluation of reduction in worker exposure and risk. |
| **BIAC** | Many of the substances proposed as alternatives to methylene chloride change the hazard and risks involved in the paint stripping process or other use by the consumer. As the proposals in this section are to be "Risk Reduction", a change to not fully evaluated health risks or additional physical hazards such as flammability from certain alternatives cannot be seen as achieving a risk reduction. |

| – 11. Please describe any alternative methods of use of the methylene chloride based paint strippers which could lower exposure of the operator to methylene chloride. [Only respond if the method is currently in place and not discussed in the Risk Reduction Monograph.] | |
|---|---|
| **Austria** | No information available. |
| **Belgium** | NR |
| **Canada** | NR |
| **Finland** | NR |
| **Germany** | NR |
| **Ireland** | NR |
| **Italy** | NR |
| **Japan** | No information available. |
| **The Netherlands** | There is no method currently in place |
| **Sweden** | NR |
| **Switzerland** | No information available. |
| **United Kingdom** | The UK authorities have no knowledge of alternative paint removal systems other than those detailed in the Monograph. |
| **United States** | The US producers'/users' group on halogenated solvent emissions, the Center for Emissions Control, conducted research in 1992 on a perimeter ventilation system for flow tanks used in most furniture refinishing shops in the USA. This data has been widely distributed in the industry. The US National Institute for Occupational Safety and Health has issued a pamphlet on worker exposures in furniture stripping and mechanisms of reduction dated September 1993. |
| **BIAC** | NR |

# ANNEX I

## OECD Questionnaire on Methylene Chloride and Other Paint Stripping Formulations

**(July 1995)**

### I Risk Information

1. Have you conducted an evaluation of the hazard and/or risk to man and the environment from chemicals that may be used for paint stripping formulations?
   If so, could you please provide a copy of this evaluation?

2. Have you any new data on the health and environmental effects of methylene chloride that are not cited in the Monograph? If so, could you please provide these data?

3. Has your assessment of the risk posed by methylene chloride changed since the Monograph was published?

### II Production and Use

4. What is the current level and trend over the last three years for the production, import and export of methylene chloride in your country?

5. What is the current level and trend over the last three years for the production, import and export of other paint stripping formulations?

6. Do you have any information which compares the cost of production and use of methylene chloride with that of other chemicals (or alternative systems) which have comparable technical efficacy?

7. Do you have any information which evaluates the use of various paint removal systems under consumer and industrial conditions?

### III Risk Reduction Measures

8. *Governments only:* have you implemented, or do you plan to implement, any risk reduction measures (e.g., regulations) to reduce workplace emissions or releases from point sources of methylene chloride to air or water? [only respond if this information is not currently in the Monograph]

9. *Industry only:* have you installed new equipment, or made process changes, to control releases of methylene chloride? [only respond if this information is not currently in the Monograph]

10. Have you evaluated the effectiveness of any of the risk reduction measures identified in the Monograph or those provided in response to questions 8 and 9 above?

11. Please describe any alternative methods of use of methylene chloride based paint strippers which could lower exposure of the operator to methylene chloride [only respond if the method is currently in place and not discussed in the Monograph]

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**For more information, and the full text of many of these publications, consult the OECD's World Wide Web site (http://www.oecd.org/ehs/)**

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***Please note*:**

[F] ***indicates that the entire publication is available from the OECD in a separate French translation. The other publications on this list are generally available in English only, but they often include a French summary.***

# The OECD Environment Monograph Series

*Since 1988, the Environment Monograph Series has made technical documents prepared by the OECD Environment Directorate available to the public. In mid 1996, this well received series was discontinued.* ***The Environmental Health and Safety Division now publishes its complimentary documents in six different series:***

**Testing and Assessment;**

**Good Laboratory Practice and Compliance Monitoring;**

**Pesticides**;

**Risk Management**;

**Harmonization of Regulatory Oversight in Biotechnology;** and

**Chemical Accident Prevention, Preparation and Response**.

*Translations of the Series on Good Laboratory Practice and Compliance Monitoring into German, Russian, Polish, Czech, Slovak, Hebrew, Spanish and Italian exist or are planned.*

*Some of the publications on this list are shown with an Environment Monograph number **and** one of the new series numbers. Either number can be used to order these documents. All the documents listed here were prepared by the Environmental Health and Safety Division. With the exception of publications on sale through the OECD Publications Service, copies of all these documents are available upon request at no charge directly from the Environmental Health and Safety Division (see page 25).*

**Environment Monograph No. 14**, *Final Report of the Expert Group on Model Forms of Agreement for the Exchange of Confidential Data on Chemicals* (1988)[F]

**No. 15**, *Final Report of the Working Group on Mutual Recognition of Compliance with Good Laboratory Practice* (1988)[F]

**No. 17**, *The Use of Industry Category Documents in Source Assessment of Chemicals* (1989)[F]

**No. 24**, *Accidents Involving Hazardous Substances* (1989)[F]

**No. 25**, *A Survey of Information Systems in OECD Member Countries Covering Accidents Involving Hazardous Substances* (1989)[F] **[out of print]**

**No. 26**, *Report of the OECD Workshop on Ecological Effects Assessment* (1989)[F]

**No. 27**, *Compendium of Environmental Exposure Assessment Methods for Chemicals* (1989)[F]

**No. 28**, *Workshop on Prevention of Accidents Involving Hazardous Substances: Good Management Practice* (1990)[F]

**No. 29**, *Workshop on the Provision of Information to the Public and on the Role of Workers in Accident Prevention and Response* (1990)[F]

**No. 30**, *Workshop on the Role of Public Authorities in Preventing Major Accidents and in Major Accident Land-Use Planning* (1990)[F]

**No. 31**, *Workshop on Emergency Preparedness and Response and on Research in Accident Prevention, Preparedness and Response* (1990)[F]

**No. 35**, *A Survey of New Chemicals Notification Procedures in OECD Member Countries* (1990)[F]

**No. 36**, *Scientific Criteria for Validation of In Vitro Toxicity Tests* (1990)[F]

**No. 39**, *International Survey on Biotechnology Use and Regulations* (1990)[F]

OCDE/GD(91)102 *Users Guide to Hazardous Substance Data Banks Available in OECD Member Countries* (1991)[F] ***[out of print]***

OCDE/GD(91)103 *Users Guide to Information Systems Useful to Emergency Planners and Responders Available in OECD Member Countries* (1991)[F] ***[out of print]***

[The two Users Guides above were translated into Spanish by UNEP IE.]

**No. 43**, *International Directory of Emergency Response Centres* (1992)[F]
***[under revision by the OECD and UNEP IE]***

[The International Directory is a co-operative project of OECD and UNEP IE. The emergency response centres in the Directory are located in OECD and non-OECD countries.]

**No. 44**, *Workshop on Prevention of Accidents Involving Hazardous Substances: The Role of the Human Factor in Plant Operations* (1992)

**No. 45**, *The OECD Principles of Good Laboratory Practice* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 1]*** (1992)[F]

**No. 46**, *Guides for Compliance Monitoring Procedures for Good Laboratory Practice* (1992)[F]

[***superseded*** by Environment Monograph No. 110, *Revised Guides for Compliance Monitoring Procedures for Good Laboratory Practice* (1995)]

**No. 47**, *Guidance for the Conduct of Laboratory Inspections and Study Audits* (1992)[F]

[***superseded*** by Environment Monograph No. 111, *Revised Guidance for the Conduct of Laboratory Inspections and Study Audits* (1995)]

**No. 48**, *Quality Assurance and GLP* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 4]*** (1992)[F]

**No. 49**, *Compliance of Laboratory Suppliers with GLP Principles* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 5]*** (1992)[F]

**No. 50**, *The Application of the GLP Principles to Field Studies* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 6]*** (1992)[F]

**No. 51**, *Guiding Principles for Chemical Accident Prevention, Preparedness and Response: Guidance for Public Authorities, Industry, Labour and Others for the Establishment of Programmes and Policies related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances Areas* (1992)[F]

[The Guiding Principles are also available from the OECD in Russian and may be translated into other languages. In 1996, two Guidance Documents to be used in conjunction with the Guiding Principles were published (see below). For more information, please contact the Environmental Health and Safety Division.]

**No. 52**, *Report of the OECD Workshop on Monitoring of Organisms Introduced into the Environment* (1992)

**No. 58**, *Report of the OECD Workshop on Quantitative Structure Activity Relationships (QSARS) in Aquatic Effects Assessment* (1992)

**No. 59**, *Report of the OECD Workshop on the Extrapolation of Laboratory Aquatic Toxicity Data to the Real Environment* (1992)

**No. 60**, *Report of the OECD Workshop on Effects Assessment of Chemicals in Sediment* (1992)

**No. 65**, *Risk Reduction Monograph No. 1: Lead. Background and National Experience with Reducing Risk* ***[Series on Risk Reduction No. 1]*** (1993)

**No. 66**, *Report of the OECD Workshop on Strategies for Transporting Dangerous Goods by Road: Safety and Environmental Protection* (1993)

[The OECD's Chemical Accidents Programme and Road Transport Research Programme co-operated in organising this workshop.]

**No. 67**, *Application of Structure-Activity Relationships to the Estimation of Properties Important in Exposure Assessment* (1993)

**No. 68**, *Structure-Activity Relationships for Biodegradation* (1993)

**No. 69**, *Report of the OECD Workshop on the Application of Simple Models for Exposure Assessment* (1993)

**No. 70**, *Occupational and Consumer Exposure Assessments* (1993)

**No. 73**, *The Application of the GLP Principles to Short-term Studies* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 7]*** (1993)[F]

**No. 74**, *The Role and Responsibilities of the Study Director in GLP Studies* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 8]*** (1993)[F]

**No. 76**, *Guidance Document for the Development of OECD Guidelines for Testing of Chemicals* (1993; reformatted 1995) ***[Series on Testing and Assessment No. 1]***[F]

**No. 77**, *Data Requirements for Pesticide Registration in OECD Member Countries: Survey Results* ***[Series on Pesticides No. 1]*** (1993)

**No. 81**, *Health Aspects of Chemical Accidents: Guidance on Chemical Accident Awareness, Preparedness and Response for Health Professionals and Emergency Responders Areas* (1994)[F]

[Four international organisations collaborated in the preparation of this publication: the International Programme on Chemical Safety (IPCS), OECD, UNEP IE, and the World Health Organization - European Centre for Environment and Health (WHO-ECEH).]

**No. 88**, *US EPA/EC Joint Project on the Evaluation of (Quantitative) Structure Activity Relationships* (1994)

**No. 90**, *Ottawa '92: The OECD Workshop on Methods for Monitoring Organisms in the Environment* (1994)

**No. 91**, *Compendium of Methods for Monitoring Organisms in the Environment* (1994)

[Monographs No. 90 and 91 are companion documents.]

**No. 92**, *Guidance Document for Aquatic Effects Assessment [**Series on Testing and Assessment No. 3]*** (1995)

**No. 93**, *Report of the OECD Workshop on Chemical Safety in Port Areas* (1994)

[This Workshop was co-sponsored by OECD, the International Maritime Organization (IMO) and UNEP. Also see Monograph No. 188.]

**No. 94**, *Report of the OECD Special Session on Chemical Accident Prevention, Preparedness and Response at Transport Interfaces Areas* (1995)

**No. 95**, *Report of the OECD Workshop on Small and Medium-sized Enterprises in Relation to Chemical Accident Prevention, Preparedness and Response Areas* (1995)

**No. 98**, *Detailed Review Paper on Biodegradability Testing **[Series on Testing and Assessment No. 2]*** (1995)

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**No. 101**, *Risk Reduction Monograph No. 2: Methylene Chloride. Background and National Experience with Reducing Risk* ***[Series on Risk Reduction No. 2]*** (1994)

**No. 102**, *Risk Reduction Monograph No. 3: Selected Brominated Flame Retardants. Background and National Experience with Reducing Risk* ***[Series on Risk Reduction No. 3]*** (1994)

**No. 103**, *Risk Reduction Monograph No. 4: Mercury. Background and National Experience with Reducing Risk* ***[Series on Risk Reduction No. 4]*** (1994)

**No. 104**, *Risk Reduction Monograph No. 5: Cadmium. Background and National Experience with Reducing Risk* ***[Series on Risk Reduction No. 5]*** (1994)

**No. 105**, *Report of the OECD Workshop on Environmental Hazard/Risk Assessment* ***[Series on Testing and Assessment No. 4]*** (1995)

**No. 106**, *Data Requirements for Registration of Biopesticides in OECD Member Countries: Survey Results* ***[Series on Pesticides No. 3]*** (1996)

**No. 107**, *Report of the OECD Workshop on the Commercialisation of Agricultural Products Derived through Modern Biotechnology* ***[Series on Harmonization of Regulatory Oversight in Biotechnology No. 3]*** (1995)

**No. 108**, *Final Report on the OECD Pilot Project to Compare Pesticide Data Reviews* ***[Series on Pesticides No. 2]*** (1995)

**No. 110**, *Revised Guides for Compliance Monitoring Procedures for Good Laboratory Practice* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 9]*** (1995)[F]

**No. 111**, *Revised Guidance for the Conduct of Laboratory Inspections and Study Audits* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 10]*** (1995)[F]

**No. 115**, *Guidance for the Preparation of GLP Inspection Reports* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 11]*** (1995)[F]

**No. 116**, *The Application of the Principles of GLP to Computerised Systems* ***[Series on Good Laboratory Practice and Compliance Monitoring No. 12]*** (1995)[F]

**No. 117**, *Industrial Products of Modern Biotechnology Intended for Release to the Environment: The Proceedings of the Fribourg Workshop* ***[Series on Harmonization of Regulatory Oversight in Biotechnology No. 4]*** (1996)

**No. 118**, *Guidance Concerning Chemical Safety in Port Areas. Guidance for the Establishment of Programmes and Policies Related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances. Prepared as a Joint Effort of the OECD and the International Maritime Organization (IMO) (1996)*

OCDE/GD(96)104 *Guidance concerning Health Aspects of Chemical Accidents. For Use in the Establishment of Programmes and Policies Related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances. To Be Read in Conjunction with the OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response Areas* (1996)

OCDE/GD(96)121 *Activities to Reduce Pesticide Risks in OECD and Selected FAO Countries. Part 1: Summary Report* ***[Series on Pesticides No. 4]*** (1996)[F]

OCDE/GD(96)122 *Activities to Reduce Pesticide Risks in OECD and Selected FAO Countries. Part 2: Survey Responses* ***[Series on Pesticides No. 5]*** (1996)

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*Consensus Document on Information Used in the Assessment of Environmental Applications Involving* Pseudomonas

*Consensus Document on Information Used in the Assessment of Environmental Applications Involving Rhizobiacea*

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